DEC STD 009-1 Product Engineering Specifications: Electrical, Physical, and Environmental Parameters

DOCUMENT IDENTIFIER: A-DS-EL00009-01-0000 Rev H, 31-Jul-1992

ABSTRACT: This document defines the minimum electrical, physical, and environmental parameters required in a Product Engineering Specification. This information must be compiled during product testing in order to reflect shippable products. This data is needed for Digital personnel to accurately prepare computer sites, write sales literature, and create hardware installation, training, and operation manuals.

APPLICABILITY: Engineering is required to provide the data necessary for this standard. Marketing, Documentation and Course Development, Digital Services, and facility engineering personnel who use Product Engineering Specifications as the source for electrical, physical, and environmental parameters for products are required to use this data.

STATUS: Approved 31-Jul-1992; use VTX SMC for current status.

This document is confidential and proprietary, and is the property of Digital Equipment Corporation. It is an unpublished work protected under applicable copyright laws.

© Digital Equipment Corporation. 1990, 1992. All rights reserved.

DEC STD 009-1 Product Engineering Specifications: Electrical, Physical, and Environmental Parameters

DOCUMENT IDENTIFIER: A-DS-EL00009-01-0000 Rev H, 31-Jul-1992

REVISION HISTORY:	Rev A,	25-Mar-1982	
	Rev B,	17-Aug-1983	ECO Number MLO01
	Rev C,	03-Oct-1985	ECO Number APO02
	Rev D,	04-May-1987	ECO Number CTS03
	Rev E,	16-Mar-1990	ECO Number CTS04
	Rev F,	01-Nov-1990	ECO Number CTS05
	Rev H,	31-Jul-1992	ECO Number NRO06

Document Management Category:	Product Documentation (HCP)
Responsible Department:	Digital Services Technology Office
Responsible Person:	George M. Kauffman
SMC Writer:	Thomas Goodwin

APPROVAL: This document has been reviewed and recommended for approval by the General Review group for its category.

George Kauffman - Digital Services Technology Consultant

Eric Williams - Standards Process Manager

Direct requests for further information to:

George Kauffman
Use $ VTX ELF for the latest location information.

Use VTX SMC to order copies of this document from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

The DIGITAL logo is a trademark of Digital Equipment Corporation.

CONTENTS

1 INTRODUCTION 1
1.1 PURPOSE 1
1.2 SCOPE 1
1.3 RESPONSIBILITIES OF EQUIPMENT DESIGN ENGINEERS 1
1.4 CONFORMANCE 2
1.5 GENERAL METHODS 3
1.5.1 Test Units 3
1.5.2 Measurement Error Considerations 3
1.5.2.1 Specifications Obtained by Measurement 3
1.5.2.2 Rounding of Data 3
1.5.2.3 Specifications Verified by Measurement 4
1.5.3 Preliminary Information 4
1.5.4 Recording of Information 4
1.5.5 Media 4
1.5.6 Devices That Output Alternating Current 5
1.5.7 Nonapplicable Parameters 5
1.5.8 Additional Parameters 5
1.5.9 Measurement Units 5
1.5.10 Alternate Construction and Second Sourcing 5
2 APPLICABLE PRODUCTS (Refer to Figure 1) 6
3 PHYSICAL SPECIFICATIONS (Refer to Figure 2) 7
4 ENVIRONMENTAL SPECIFICATIONS (Refer to Figure 3) 8
5 DC POWER SPECIFICATIONS (Refer to Figure 4) 10
6 ELECTROMAGNETIC SUSCEPTIBILITY (EMS) SPECIFICATIONS (Refer to Figure 5) 11
7 USER DISPLAY SPECIFICATIONS (Refer to Figure 6) 12
8 AC INPUT POWER SPECIFICATIONS (Refer to Figures 7 and 8) 13
9 STANDARDS CONFORMANCE AND APPROVAL 17
Appendix A REFERENCED DOCUMENTS 31
A.1 EL-Class Digital Documents 31

FIGURES

1 Applicable Products Sheet (Refer to DEC STD 009-1, Head 2) 18
2 Physical Specifications (Refer to DEC STD 009-1, Head 3) 19
3 Environmental Specifications (Refer to DEC STD 009-1, Head 4) 21
4 DC Power Specifications (Refer to DEC STD 009-1, Head 5) 23
5 Electromagnetic Susceptibility (Refer to DEC STD 009-1, Head 6) 24
6 User Display Specifications (Refer to DEC STD 009-1, Head 7) 25

7 AC Input Power Specifications—Group A (Refer to DEC STD 009-1, Head 8) 26
8 AC Input Power Specifications—Group B (Refer to DEC STD 009-1, Head 8) 28

TABLES

1 Product Compliance 2

1 INTRODUCTION

Digital must provide its customers with product information that, if not properly coordinated, could appear as conflicting or erroneous. To reach the customer, this information must flow from Engineering to groups that write or prepare this information for internal or external customers, such as marketing, sales, service, education, and manufacturing. Therefore, a clearly defined vehicle is crucial for the transmission of clear, comprehensive information from the engineer to the customer.

This standard describes the data to be included in product engineering documentation to provide a source for consistent and accurate information about products. It permits engineering to collate all relevant parameters concerning a product in the product's Engineering Specification and make this information available to all personnel who deal with customers.

The information required by this standard is to be transmittable to any customer.

1.1 PURPOSE

This standard defines the minimum electrical, physical, and environmental parameters that must be included in a Product Engineering Specification. This information must be compiled during product testing so that it describes shippable products. This data is needed by Digital personnel to accurately perform such tasks as preparing customer sites, writing sales literature, and creating hardware installation and operation manuals. Once the information is compiled and released, it will be accessible to all Digital personnel.

1.2 SCOPE

This standard outlines the minimum parameters needed to properly specify a product's electrical, environmental, and physical characteristics. These parameters are grouped into generic categories. Some categories apply to a particular product while others do not. See subhead 1.4 to determine which categories are applicable. Figures 2 through 8 are provided to record parameters as they are defined in headings 3 through 8.

Cables, media, software, and systems composed of properly specified products are not addressed by this section. However, all products contained in a higher level assembly of components, or expanded components, shall be specified according to this standard.

NOTE

The parameters covered here do not include product performance specifications.

1.3 RESPONSIBILITIES OF EQUIPMENT DESIGN ENGINEERS

Equipment design engineers, at the product level, are responsible for using this standard. They are responsible for completing and updating all of the tables contained herein as they apply to a particular product. Further, it is the responsibility of the product design engineer to verify or obtain, by testing or measurement, all of the appropriate parameters, and to include them in the product engineering documentation.

1.4 CONFORMANCE

Any hardware product listed in the Option/Module List must have all applicable specification figures completed. Exceptions are noted in subhead 1.2. Table 1 identifies the figures in this document that must be provided for your product.

Table 1: Product Compliance

Heading	Title	Figure	Product Type
3	Physical Specifications	2	Any product, equipment, hardware, module, or option.
4	Environmental Specifications	3	Any product (including media used by the product), that has temperature, humidity, vibration, acoustics, or other environmental constraints (that is, any product subject to *DEC STD 102-0 Environmental Standard for Computers and Peripherals - General Test Requirements*).
6	DC Power Specifications	4	Any product that uses or inputs dc power from external sources, or is a source of dc power to other devices.
7	Electromagnetic Susceptibility (EMS) Specifications	5	Any product subject to *DEC STD 103-0 Electromagnetic Compatibility (EMC) - Overview and Process Requirements.*
8	User Display Specifications	6	Any product with a display for the user, for example, a cathode ray tube (CRT) or a video product.
5	AC Input Power Specifications	7 and 8	Any product that has an ac line cord or that connects to utility power (that is, any product subject to *DEC STD 122-0 AC Power Line Standard: Design Requirements and Guidelines*).
9	Standards Conformance and Approval	NA	Any product that must meet regulatory requirements.

1.5 GENERAL METHODS

1.5.1 Test Units

A minimum of five units is recommended for obtaining final test data. For certain tests, such as shock and vibration, altitude, EMC, and so on, final data can be obtained by testing only one unit. Use Figures 2 through 8 to record minimum, typical, and maximum values. *Minimum* values represent the minimum values obtained from the test units. *Typical* values shall be obtained by averaging the values from the basic test units. *Maximum* values shall be the maximum values obtained from any test unit at the fully expanded worst case load.

The minimum usable configuration and the maximum design limits of a device shall be specified. This enables the configurator to have the necessary information to calculate the appropriate parameters.

There may be more than one minimum configuration, usually based on different power supply/thermal limits/maximum configuration capability or different logic types. The minimum configuration is identified by the product number and variation.

1.5.2 Measurement Error Considerations

Most of the specifications addressed in this section must be obtained or verified by measurement. A recommended overall measurement accuracy is given for each parameter. The actual measurement accuracy for a test depends upon the instruments used. The actual measurement error—assumed to equal the measurement accuracy—must be accounted for in obtaining or verifying minimum and maximum specifications. The actual measurement error should be applied to make the data more conservative when it is recorded in the product documentation.

1.5.2.1 Specifications Obtained by Measurement

In general, typical values do not need to account for errors of the order of the listed suggested measurement accuracy, other than the averaging mentioned in subhead 1.5.1. Data obtained by measurement (heat dissipation, ac and dc currents, ac and dc power, and so on) must be adjusted by the value of the measurement error to make the data more conservative.

For example, if maximum inrush current is measured with ± 6% accuracy, readings must be increased by 6% to compensate for this possible error, thereby making the data conservative.

In another example, if maximum power consumption is measured with ± 4% accuracy, the data must be increased by 4% to compensate for the possible error.

1.5.2.2 Rounding of Data

The data should be rounded to avoid the reporting of insignificant digits. The rounding should not exceed one-half of the expected measurement equipment accuracy.

For example, a height dimension of 244.45 millimeters could be rounded by ¼% (± 0.6 millimeters) to be given as either 244 millimeters or 245 millimeters, whichever is more conservative.

In another example, a reading of maximum power consumption is 121 watts. This reading is increased to 125.84 W, per subhead 1.5.2.1, to compensate for the 4% error. The final value can be rounded to either 125 W or 126 W.

1.5.2.3 Specifications Verified by Measurement

The minimum and maximum specifications verified by measurement (temperature, humidity, voltage and frequency range, mechanical shock and vibration, output wattage, and so on) should have measurements with margins equal to or greater than the actual measurement error.

For example, if relative humidity of 20% to 80% is verified with ± 3% measurement accuracy, the instrument should indicate 17% to 83% relative humidity.

In another example, if a voltage range of 90 to 128 volts is verified with a ± 2% measurement accuracy, the instrument should indicate 88 to 131 volts.

Finally, if a frequency range of 47 to 53 hertz is verified with ± 0.5 hertz measurement accuracy, the instrument should indicate 46.5 to 53.5 hertz.

NOTE

Use of instruments with poor accuracy may require the product to be verified with wide margins. If a product fails because of this effect, an instrument with better accuracy may be used to decrease the test condition margins.

1.5.3 Preliminary Information

Prior to the availability of measured data, estimated or calculated information can be used for preliminary specifications. Measured data must replace estimates prior to signoff of the affected documents.

1.5.4 Recording of Information

A Product Engineering Specification should be used to record the required information.

Specification tables shall also be recorded in the Product IQ document. The Engineering Specification should clearly refer to the IQ document number.

The original engineering notebook and test reports should be maintained by the engineering group as a source document for future reference.

1.5.5 Media

Any product that has subassemblies (including media such as paper, disks, and magnetic tape) must include the most restrictive limits or requirements in the specification for the product and media.

NOTE

If extended range media or special media give a significantly better performance or range, this information must be included in the Product Engineering Specification as well as in the specification tables.

1.5.6 Devices That Output Alternating Current

For devices that output ac power, *typical* ac input specification values do not include external ac loading that is not part of the product being specified. *Maximum* ac input specification values shall include maximum rated loading on the ac output, as well as maximum internal loading.

1.5.7 Nonapplicable Parameters

If a table calls for data that is not applicable or has no relevance to a product being tested, *NA* should be entered in the table.

1.5.8 Additional Parameters

This section outlines minimum requirements. If additional parameters are required to fully describe the unit in question, add them to the appropriate tables. Be certain to define any additional parameters that are special or modified for the product. Include drawings, notes or special installation instructions if required.

1.5.9 Measurement Units

Measurement units must be in both SI (metric) and U.S. customary units. See DEC STD 015-0 *Abbreviations and Units of Measurement.*

1.5.10 Alternate Construction and Second Sourcing

If an alternate construction method or second sourcing method is used for a particular product, only one set of specifications is necessary, provided that all of the parameters are within the suggested measurement accuracy limit. If these parameter changes exceed this limit, different specification sheets may be required based upon product variation or revision. If there are only a few minor discrepancies, a note may provide the necessary information. Refer to subhead 1.5.8.

2 APPLICABLE PRODUCTS (Refer to Figure 1)

Parameter	Description
Date	The date in DD-MON-YEAR format
Engineer	Provide the name of the engineer that is responsible for the data provided here.
Nominal voltage change technique	Indicate how the nominal ac voltage is changed for this product. Do not distinguish between nominals with overlapping ranges, such as 220 V and 240 V or 100 V and 120 V, unless action is needed to change from one nominal to the other. The typical techniques used should be identified as: a. Different product b. Different input assembly c. Customer adjustable selector d. Non-customer adjustable selector, such as switch, jumper or tap change e. Wide input voltage range f. Automatic voltage switching g. No other nominals offered
Product Family	Product family name, such as VAXstation 4000.
Product Name	Product marketing designation, such as VS4000-Model 60.
Nominal voltage	List the nominal voltages that are used in Figures 7 and 8.
Product 2-5-2 number	List the applicable product 2-5-2 numbers for the data provided in Figures 7 and 8 for Digital products. **Use the product numbers that appear on the product nameplate.** List the vendor part numbers for the product without Digital part numbers.
Product description	Provide brief description of the product in 25 words or less.

3 PHYSICAL SPECIFICATIONS (Refer to Figure 2)

Parameter	Description	Suggested Measurement Accuracy
Mounting type	The following codes can be used: freestanding, rack mounted, tabletop, wall mounted, module.	NA
Height	Distance from lowest to highest or uppermost point.	± 1/2%
Width	Distance from side to side (including projections and with end panels installed.)	± 1/2%
Depth	Distance from front to back.	± 1/2%
Weight	Measured weight. *Typical* is without additional options and *maximum* is fully expanded.	± 3%
Point load	Maximum force exerted on floor, when installed, at any point of contact (that is, wheels or feet) under worst-case loading conditions.	±5%
Operation clearance	Minimum clearance required for operation of the device, including operator access, air flow, paper and media handling, and cabling.	NA
Service clearance	Minimum clearance required for service access to the device.	NA
Shipping height[1]	Distance from base to top of carton.	± 1%
Shipping width[1]	Distance between sides of carton.	± 1%
Shipping depth[1]	Distance from front to back of carton.	± 1%
Shipping weight[1]	Typical packaged shipping weight.	± 5%
Enclosure type	If the product variation includes or requires a particular cabinet or mounting box, indicate the type of enclosure, such as H9642, BA11-A.	NA

[1]Shipping for standard shipping container

4 ENVIRONMENTAL SPECIFICATIONS (Refer to Figure 3)

NOTE

Refer to *DEC STD 102-01 Environmental Standard for Computers and Peripherals - Temperature, Humidity, and Altitude Test Requirements* for more information on the following parameters.

Parameter	Description	Suggested Measurement Accuracy
Temperature (Operating)	Minimum and maximum air intake temperatures while operating.	± 1°C ± 2°F
Altitude Derating	Operating temperature derating for altitude above sea level.	N/A
Temperature (Nonoperating)	Minimum and maximum temperatures of unpackaged product.	± 1°C ± 2°F
Temperature (Storage)	Minimum and maximum long-term storage temperatures.	± 1°C ± 2°F
Relative humidity (Operating)	Minimum and maximum intake air relative humidity while operating.	± 3%RH
Relative humidity (Nonoperating)	Minimum and maximum relative humidity of unpackaged product.	± 3%RH
Relative humidity (Storage)	Minimum and maximum long-term storage relative humidity.	± 3%RH
Maximum wet bulb temperature (Operating)	Maximum tested wet bulb temperature while operating.	± 1°C ± 2°F
Maximum wet bulb temperature (Storage)	Maximum wet bulb long-term temperature while equipment is stored.	± 1°C ± 2°F
Minimum dew point temperature (Operating)	Minimum tested dew point while operating.	± 1°C ± 2°F
Heat dissipation	Total heat dissipation of product, at typical (for this product only) and maximum (full loading), at nominal line voltage.	± 2%
Air flow intake and exhaust location	Indicate location of cooling air intake and exhaust ports.	NA

Parameter	Description	Suggested Measurement Accuracy
Altitude (Operating)	Maximum altitude (or simulated altitude) while operating. (Above sea level)	± 5%
Altitude (Nonoperating)	Maximum altitude (or simulated altitude) while not operating. (Above sea level)	± 5%
Mechanical shock (Operating)	Shock level (g peak) and duration (ms) while operating.	± 10%
Vibration (Operating)	Frequency range and vibration level while operating (levels typically in g peak or double amplitude).	± 5%
Mechanical shock (Nonoperating)	Shock level (g peak) and duration (ms) while not operating and packaged for shipment.	± 10%
Vibration (Nonoperating)	Frequency range and vibration level while not operating and packaged for shipment (levels typically in g peak or double amplitude).	± 5%

NOTE

Refer to *DEC STD 102-4 Environmental Standard for Computers and Peripherals - Product Acoustic Noise Measurement.*

Acoustic emission	LNPE (Noise Power Emission Level)—A weighted sound power level measured in Bels relative to one picowatt. LPA—A weighted sound pressure level measured in dB at either the front operator or front bystander position.	

5 DC POWER SPECIFICATIONS (Refer to Figure 4)

Parameter	Description	Suggested Measurement Accuracy
Power consumption	The dc power used by the device in intended use. Typical load (this product only—no expansion).	± 2%
Current at each dc voltage	Current drawn at each dc voltage. Typical load (this product only—no expansion; basic product only).	± 2%
Voltage ripple	Maximum peak-to-peak ripple allowed at each dc voltage nominal.	± 0.5%
DC voltage range	Minimum and maximum voltage while operating for each dc voltage nominal.	± 1%
DC output amperes available at each dc voltage	Available current to power additional options at each dc voltage. This current is the minimum rated total output at each dc voltage minus the maximum dc current load that exists in this product without expansion.	± 5%
DC output watts available	Total calculated watts of dc available to power additional options (without adding more power supplies). This is the minimum rated dc output power of the power supplies minus the maximum dc load that exists in this product without expansion.	NA

NOTE

The last two parameters should use the maximum dc output for the power system, constrained by power supply, thermal, or similar limitations.
In cases of fixed configuration without expansion, these two parameters are not required, and can be marked *Not Applicable*.

6 ELECTROMAGNETIC SUSCEPTIBILITY (EMS) SPECIFICATIONS (Refer to Figure 5)

Parameter	Description	Suggested Measurement Accuracy
Broadband conducted EMI	The maximum tolerated broadband signal level injected on the input lines per DEC STD 103-0.	± 3dB
Narrowband conducted transients	The maximum tolerated narrowband signal level injected on the input lines per DEC STD 103-0.	± 3dB
Narrowband radiated susceptibility	The maximum tolerated narrowband radiated field strength tested per DEC STD 103-0.	± 3dB
ESD control	Electrostatic discharge levels this product has passed. This is usually the maximum level of discharge without causing hard failure. Refer to DEC STD 103-0.	± 500V

7 USER DISPLAY SPECIFICATIONS (Refer to Figure 6)

Parameter	Description	Suggested Measurement Accuracy
Screen refresh rate	Nominal screen refresh rate used by the display.	NA
Horizontal frequency	Nominal frequency of horizontal retrace.	NA
X-ray radiation	Level of X-ray emission from the display at the operator's position.	± 10%
Ultraviolet (UV) radiation	The level of UV emission from the display at the operator's position.	± 10%
Electrostatic field	The electrical field emitted by the product at 0.3 m (12 in).	± 10%
Magnetic field effects	The time rate of change of the low frequency magnetic field emitted by the product at 0.3 m (12 in).	± 10%

NOTE 1

The testing for the above parameters ensures that the minimum levels stated in DEC STD 103-0 are realized during testing.

NOTE 2

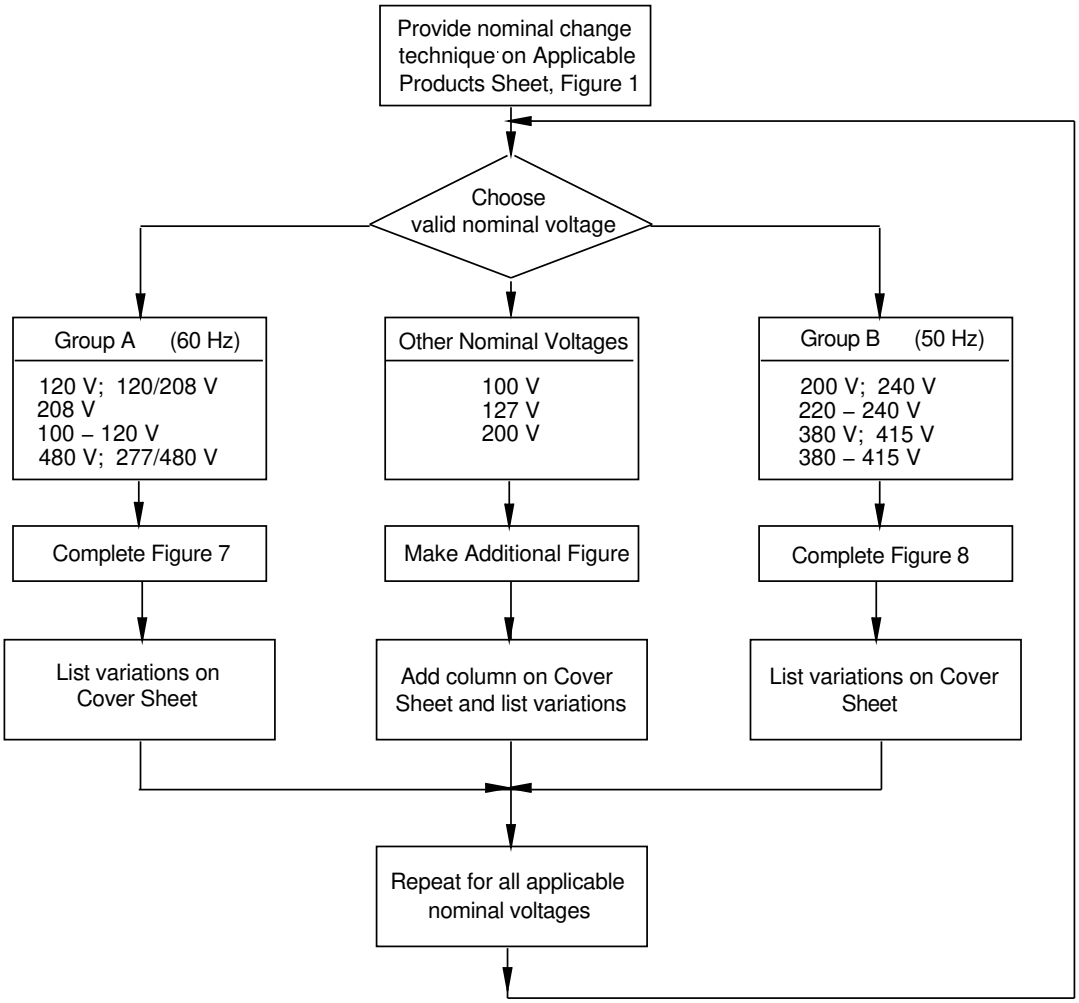
Emissions testing requirements are included within the EMC test methods in DEC STD 103-0. These detailed emissions specifications, in addition to noting the applicable regulatory approval, are not required to be recorded here.

8 AC INPUT POWER SPECIFICATIONS (Refer to Figures 7 and 8)

Complete as many Figures 7 and 8 as necessary for all the ac line nominal voltages that this product uses.

It is not recommended to separate nominals with substantially overlapping ranges, such as 220 V and 240 V or 100 V and 120 V, unless action is required to change from one nominal to another, or specific restrictions apply to one of the nominals.

Figure 7 is intended for Group A (usually includes North America, Japan, and other markets) voltages, while 8 is intended for Group B (usually includes Europe and other markets) voltages. Each nominal voltage requires an individual set of Figures 7 and 8. Produce duplicates of Figures 7 and 8 for additional nominals (such as 100 V, 127 V) as required. Please refer to the following flow chart.


Provide nominal change technique on Applicable Products Sheet, Figure 1
Choose valid nominal voltage
Group A (60 Hz)
120 V; 120/208 V
208 V
100 – 120 V
480 V; 277/480 V
Other Nominal Voltages
100 V
127 V
200 V
Group B (50 Hz)
200 V; 240 V
220 – 240 V
380 V; 415 V
380 – 415 V
Complete Figure 7
Make Additional Figure
Complete Figure 8
List variations on Cover Sheet
Add column on Cover Sheet and list variations
List variations on Cover Sheet
Repeat for all applicable nominal voltages

NOTE

Products offered with only one nominal voltage should only require Figure 7 table for all variations. Multinominal devices should require a minimum of Figures 7 and 8. Multinominal devices that are either auto voltage switching or wide input voltage range will have both Figures 7 and 8 applicable to all of the list

product numbers. All other multinominal devices may have product 2-5-2 numbers dependent upon the nominal voltage.

Parameter	Description	Suggested Measurement Accuracy
Nominal voltage	Nominal ac voltage nameplate rating for this product (see DEC STD 122-0 and *DEC STD 178-3 Digital Marking Requirements for Completed Products Intended to be Sold*). One nominal per ac power specification table only. Additional nominal voltages may require additional sheets.	NA

NOTE

Enter nominal voltage as described in DEC STD 122-0. For most single-phase products, nominals could include: 100 V, 120 V, 220 V, 230 V, or 240 V, 100-120 V, 220-240 V. For 3-phase products nominals include 120/208 V, 380 - 415 V.

Operational voltage range	Minimum and maximum true RMS ac line voltage (see DEC STD 122-0, Table 1-2).	± 2%
Nominal frequency	AC Line nameplate frequency for this product at the voltage nominal specified above.	NA
Frequency range	Minimum and maximum line frequency for this product. Testing is required for frequency sensitive products (disks, tapes, and so forth).	± ¼Hz
Number of phases	Number of ac power phases that this product uses.	NA
Input current (Steady state)	True RMS current for the product operating at nominal voltage. *Typical* load is for the minimum usable configuration of the device that should agree with the option and variation listed on the specification sheets. *Maximum* is for the fully expanded condition (usually based upon power supply loading limits). Record for all phases, neutral, and ground.	± 3%

NOTE 1

Ground current measurement to be obtained from product safety ground test accomplished at nominal voltage (see *DEC STD 119-1 Digital Product Safety - Design Criteria*).

NOTE 2

A true RMS responding instrument should be used for this measurement (see *DEC STD 122-1 AC Power Line Standard - Measurement of AC Power Parameters*).

NOTE 3

For products that use varying levels of current, *minimum* current is the minimum operating condition (for example, tape unloaded, disk not spinning). *Typical* current is the normal operating current (for example, tape or disk read or write

Parameter	Description	Suggested Measurement Accuracy
operations). *Maximum* current is the maximum produced during any operation (for example, head seek or rewind).		
Ride-Through time	Dropout or interrupt tolerance. Maximum time for voltage to drop from the low-line condition to 0 volts during operation and return to low-line condition without disrupting operation of the product, without causing ACLO, DCLO, or other interrupt conditions. Test is to be made at maximum dc loading conditions (see DEC STD 122-1).	± 5%
Inrush current	Maximum peak inrush (either initial or second inrush) current produced by this product on the worst-case phase (see DEC STD 122-1).	± 8%
Start-up current	Starting RMS current value (after the peak inrush) produced, on the worst-case phase, on the first cycle after inrush at the nominal line voltage. Measurement to be made at maximum (full loading) conditions (see DEC STD 122-1).	± 8%
Start-up current duration	Time required for the start-up current to fall to 110% of steady state RMS current (see DEC STD 122-1).	± 10%
Power consumption	AC Input power (watts) used by this product at *typical* load (this product only—no expansion) and *maximum* (full loading) conditions.	± 4%
Apparent power	Total volt amperes drawn by this product. The loading conditions are the same as those defined for RMS current (steady state).	NA
Power factor	Ratio of total input watts to total input volt amperes at full power supply output—maximum dc loading conditions, thus providing a *typical* power factor at maximum load conditions.	NA
Crest factor	Ratio of peak steady - state current to true RMS current values for worst-case phase. For typical product (no expansion) and at maximum dc loading conditions (see DEC STD 122-0).	NA
AC Power output	List the voltage and maximum current for each output ac circuit. Also give output method and receptacle or connector designation.	NA
Power cord type	Check if the power cord is detachable, fixed, or if the product is to be field wired.	

Parameter	Description	Suggested Measurement Accuracy
Power inlet type	Provide the power inlet type (applicable only for detachable cord devices). Typically IEC 320 C14, IEC 320 C16, or IEC 320 C20	
Power cord(s)	Provide the listed power cord information. Country–the principal country or region for the cord Refer to A-SP-EL00002-TB-0 *International Power Cables and Connectors* Plug Type — the industry designation for the plug Typically including NEMA 5-15P, IEC 309516R6, Swiss SEV 1011-1959, CEE 7/4, CEE 7/7, BS1363, and AFSNIT 107-2-01. Length—the external Cord length for use on site **NOTE** **Do not include the length of cord that is routed internally in the product.** Part number—the Digital part number for the cord assembly.	

9 STANDARDS CONFORMANCE AND APPROVAL

The purpose of this segment of the Product Engineering Specification is to outline regulatory agency compliance that the product meets. There is no figure associated with this segment.

List the applicable compliance information for each regulatory agency. Refer to *DEC STD 060-0 Design of Hardware Products to National and International Regulations and Standards, Policies and Procedures.*

Figure 1: Applicable Products Sheet (Refer to DEC STD 009-1, Head 2)

Date		
Engineer		
Nominal Voltage Change Technique		
Product Family		
Product Name		
Group A Nominal Voltage Figure 7 _____ Vac	Group B Nominal Voltage Figure 8 _____Vac	
xx–xxxxx–xx xx–xxxxx–xx xx–xxxxx–xx xx–xxxxx–xx	xx–xxxxx–xx xx–xxxxx–xx xx–xxxxx–xx xx–xxxxx–xx	
Product Description		

Figure 2: Physical Specifications (Refer to DEC STD 009-1, Head 3)

Parameter	Min	Typ	Max	Units	Symbol
Mounting type				--	--
Height	--		--	millimeters	mm
	--		--	inches	in
Width	--		--	millimeters	mm
	--		--	inches	in
Depth	--		--	millimeters	mm
	--		--	inches	in
Weight	--			kilograms	kg
	--			pounds	lb
Point Load	--	--		kilograms	kg
	--	--		pounds	lb
Operation Clearance front		--	--	millimeters	mm
		--	--	inches	in
rear		--	--	millimeters	mm
		--	--	inches	in
left side		--	--	millimeters	mm
		--	--	inches	in
right side		--	--	millimeters	mm
		--	--	inches	in

Figure 2 (Continued): Physical Specifications

Parameter	Min	Typ	Max	Units	Symbol
Service Clearance front		--	--	millimeters	mm
		--	--	inches	in
Service Clearance rear		--	--	millimeters	mm
		--	--	inches	in
Service Clearance left side		--	--	millimeters	mm
		--	--	inches	in
Service Clearance right side		--	--	millimeters	mm
		--	--	inches	in
Service Clearance top		--	--	millimeters	mm
		--	--	inches	in
*Shipping Height	--		--	millimeters	mm
	--		--	inches	in
*Shipping Width	--		--	millimeters	mm
	--		--	inches	in
* Shipping Depth	--		--	millimeters	mm
	--		--	inches	in
*Shipping Weight	--		--	kilograms	kg
	--		--	pounds	lb
Enclosure Type					

* Shipping for standard shipping container

Figure 3: Environmental Specifications (Refer to DEC STD 009-1, Head 4)

Parameter	Min	Typ	Max	Units	Symbol
Temperature (Operating)		--		degrees Celsius	°C
		--		degrees Fahrenheit	°F
Altitude Derating	--		--	degrees Celsius per Kilometer	°C/km
	--		--	degrees Fahrenheit per 1000 feet	°F/1000 ft
Temperature (Nonoperating)		--		degrees Celsius	°C
		--		degrees Fahrenheit	°F
Temperature (Storage)		--		degrees Celsius	°C
		--		degrees Fahrenheit	°F
Relative Humidity (Operating)		--		percent relative humidity (noncondensing)	%RH
Relative Humidity (Nonoperating)		--		percent relative humidity	%RH
Relative Humidity (Storage)		--		percent relative humidity (noncondensing)	%RH
Maximum Wet Bulb Temperature (Operating)	--	--		degrees Celsius	°C
	--	--		degrees Fahrenheit	°F
Maximum Wet Bulb Temperature (Storage)	--	--		degrees Celsius	°C
	--	--		degrees Fahrenheit	°F
Minimum Dew Point Temperature (Operating)		--	--	degrees Celsius	°C
		--	--	degrees Fahrenheit	°F
Heat Dissipation	--			watts	W
	--			Btu/hr	Btu/hr

Figure 3 (Continued): Environmental Specifications

Parameter		Min	Typ	Max	Units		Symbol
Altitude (Operating)		--	--		meters above sea level		m
		--	--		feet above sea level		ft
Altitude (Nonoperating)		--	--		meters above sea level		m
		--	--		feet above sea level		ft
Mechanical Shock (Operating)		Duration			milliseconds		ms
		Level			gravities		G
Vibration (Operating)	Freq. Range		--		--	hertz	Hz
	Vibration Level						
Mechanical Shock (Nonoperating)		Duration			milliseconds		ms
		Level			gravities		G
Vibration (Nonoperating)	Freq. Range		--			hertz	Hz
	Vibration Level						
Acoustic Emission	Operating	--		--	Bels		B
	LNPE LPA	--		--	decibels		dBA
	Idle/ Standby	--		--	Bels		B
	LNPE LPA	--		--	decibels		dBA
Airflow Intake and Exhaust Location		Intake Location			Exhaust Location		

Figure 4: DC Power Specifications (Refer to DEC STD 009-1, Head 5)

Input Power

Parameter		Min	Typ	Max	Units	Symbol
Power Consumption		--			watts	W
Current at each dc Voltage	Voltage:	--			amperes	A
	Voltage:	--			amperes	A
	Voltage:	--			amperes	A
DC Voltage Range	Voltage:	--	--		millivolts ripple	mV
			--		volts dc	Vdc
	Voltage:	--	--		millivolts ripple	mV
			--		volts dc	Vdc
	Voltage:	--	--		millivolts ripple	mV
			--		volts dc	Vdc

Output Power

Parameter		Min	Typ	Max	Units	Symbol
DC Output Watts Available		--	--		watts	W
DC Output Amperes Available at each dc Voltage	Voltage:	--	--		amperes	A
	Voltage:	--	--		amperes	A
	Voltage:	--	--		amperes	A

Figure 5: Electromagnetic Susceptibility (Refer to DEC STD 009-1, Head 6)

Parameter		Maximum	Units	Symbol
Broadband Conducted EMI			Volts	V
Narrowband Conducted Transients	Frequency Range		kilohertz, megahertz	kHz, MHz
	V rms into 50 ohms		Volts	V
Narrowband Radiated Susceptibility	Frequency Range		kilohertz, megahertz	kHz, MHz
	Level		Volts per Meter	V/m
ESD Control			kilovolts	kV

Figure 6: User Display Specifications (Refer to DEC STD 009-1, Head 7)

Parameter	Min	Typ	Max	Units	Symbol
Screen Refresh Rate	--		--	hertz	Hz
Horizontal Frequency	--		--	kilohertz	kHz
X-Ray Radiation	--		--	picoampere/kilogram	pA/kg
UV Radiation	--		--	watts/meter ^{2}	W/m^2
Electrostatic Field	--		--	kilovolt/meter	kV/m
Magnetic Field Effect	--		--	milliTesla/second	mT/s

Figure 7: AC Input Power Specifications—Group A (Refer to DEC STD 009-1, Head 8)

Parameter		Min	Typ	Max	Units	Symbol
Nominal Voltage		--		--	volts	V
Operational Voltage Range			--		volts	V
Nominal Frequency		--		--	hertz	Hz
Frequency Range			--		hertz	Hz
Number of Phases		--		--	none	NA
Input Current (Steady State)	Phase A	--			amperes	A
	Phase B	--			amperes	A
	Phase C	--			amperes	A
	Neutral N	--			amperes	A
	Ground G	--		--	milliamperes	mA
Ride–Through Time		--	--		milliseconds	ms
Inrush Current		--	--		amperes peak	A

Figure 7 (Continued): AC Input Power Specifications—Group A

Parameter		Min	Typ	Max	Units	Symbol
Start–Up Current		––	––		r ms amperes	A
Start–Up Current Duration		––	––		seconds	s
Power Consumption		––			watts	W
Apparent Power		––			volt amperes	VA
Power Factor		––		––	none	PF
Crest Factor		––		––	none	CF
AC Power Output	Voltage:	––	––		amperes	A
	Output Type					
	Voltage:	––	––		amperes	A
	Output Type					
	Voltage:	––	––		amperes	A
	Output Type					

Power Cord Type	Fixed		Detachable		Field Wired	
Power Inlet Type						

Power Cord	Country	Plug	Length	Part Number

Figure 8: AC Input Power Specifications—Group B (Refer to DEC STD 009-1, Head 8)

Parameter		Min	Typ	Max	Units	Symbol
Nominal Voltage		--		--	volts	V
Operational Voltage Range			--		volts	V
Nominal Frequency		--		--	hertz	Hz
Frequency Range			--		hertz	Hz
Number of Phases		--		--	none	NA
Input Current (Steady State)	Phase A	--			amperes	A
	Phase B	--			amperes	A
	Phase C	--			amperes	A
	Neutral N	--			amperes	A
	Ground G	--		--	milliamperes	mA
Ride–Through Time		--	--		milliseconds	ms
Inrush Current		--	--		amperes peak	A

Figure 8 (Continued): AC Input Power Specifications—Group B

Parameter		Min	Typ	Max	Units	Symbol
Start–Up Current		––	––		rms amperes	A
Start–Up Current Duration		––	––		seconds	s
Power Consumption		––			watts	W
Apparent Power		––			volt amperes	VA
Power Factor		––		––	none	PF
Crest Factor		––		––	none	CF
AC Power Output	voltage	––	––		amperes	A
	Output Type					
	voltage	––	––		amperes	A
	Output Type					
	voltage	––	––		amperes	A
	Output Type					

Power Cord Type	Fixed		Detachable		Field Wired	
Power Inlet						

Power Cord	Country	Plug	Length	Part Number

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00002-TB	*International Power Cables and Connectors*
EL-00015-00	*DEC STD 015-0 Abbreviations and Units of Measurement*
EL-00060-00	*DEC STD 060-0 Design of Hardware Products to National and International Regulations and Standards, Policies and Procedures*
EL-00102-00	*DEC STD 102-0 Environmental Standard for Computers and Peripherals—General Test Requirements*
EL-00102-01	*DEC STD 102-1 Environmental Standard for Computers and Peripherals—Temperature, Humidity, and Altitude Test Requirements*
EL-00102-04	*DEC STD 102-4 Environmental Standard for Computers and Peripherals—Product Acoustic Noise Measurement*
EL-00103-00	*DEC STD 103-0 Electromagnetic Compatibility (EMC) - Overview and Process Requirements*
EL-00119-01	*DEC STD 119-1 Digital Product Safety — Design Criteria*
EL-00122-00	*DEC STD 122-0 AC Power Line Standard: Design Requirements and Guidelines*
EL-00122-01	*DEC STD 122-1 AC Power Line Standard - Measurement of AC Power Parameters*
EL-00178-03	*DEC STD 178-3 Digital Marking Requirements for Completed Products Intended to be Sold*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

```
+---------------------------------------------------------------------+
|                          READER COMMENTS                            |
|                                                                     |
| Your  comments  and suggestions  will help  Standards and Methods   |
| Control improve their services and documents.                       |
+---------------------------------------------------------------------+
```

Did you request this document? _____ If so, did it arrive within a satisfactory period of time? _____ Please comment.

What are your impressions of this document? Consider format, organization, completeness, readability, and illustrations.

————————————**FOLD ON THIS LINE**———————————————————————— -

Did you find technical or clerical errors in this document? If so, please specify the page number(s) and the error(s).

Are the instructions for the update package clear? _____
Was an index available? _____ If not, is one needed? _____
Do you have other suggestions for improving this document?

The following information is optional:

Name _____ Mailstop _____

Department _____ Node _____

Send your comments to JOKUR::PROJECTS, or fold, staple, and send this page through interoffice mail to:

```
+------------------------------+
|       READERS' COMMENTS      |
| STANDARDS AND METHODS CONTROL |
|           NRO4/D4            |
+------------------------------+
```